Electronic Jacket using Arduino for a Person Working in Extreme Weather Condition

Shivganga Indi[1], Saniya Shaikh[2], Vaishnavi Wadtile[3], J. S. Hallur[4]
[123]*Student at Department of ENTC, SVERI's College of Engineering, Pandharpur, India*
[4]*Assistant Professor, ENTC, SVERI's College of Engineering, Pandharpur, India*
Corresponding Author: Shivganga Indi

Abstract
The purpose behind developing the "Electronic Jacket using Arduino for a person working in extreme weather condition" is the people who are staying or living in extreme weather conditions. The climatic change that is hot and cold temperature conditions are dangerous to the health of those people. Excessive exposure of heat causes serious problem like heat stroke. At very cold temperature, the most serious problem is the risk of hypothermia or overcooling body So, we have designed a jacket named as "Safety purpose jacket using Arduino" which gives better protection to the people who living in such tough weather conditions and the main objective behind developing this jacket is for safety of military people because they have a huge risk on their lives while working in such extreme weather conditions. The cold and hot climate conditions in the high north represents, Threat of safety and work performance of soldier or a common person. The jacket will provide better protection to them and it will help to reduce loss of human life. In addition to that if the person is not feeling well that person can press switch so that the concerned person will get a message so threat of safety will reduced. By using this jacket, the user can control and monitor the internal temperature inside the jacket by using fan and heater mounted within jacket. It consist of temperature sensor to detect the temperature, panic switch, battery and GSM modules are also used in this jacket to send message by soldier or a common man to concerned one . All this devices are controlled by Arduino. We are using heating pad for heating purpose. This information of temperature sensor can be used in enhanced safety and as an improved tool to advice outdoor work control for soldier or a common man in climate conditions. So that the specially designed "Safety purpose Jacket using Arduino" will give better protection to the person who is working in extreme weather conditions.
Keywords: Arduino, GSM, LM35, Switch, Fan, Heater.

Date of Submission: 06-06-2021   Date of acceptance: 20-06-2021

I. INTRODUCTION

Our project aims to keep up the specific temperature in the jacket, so that person will not face the heatstroke or overcooling of body; it initiates the fan and heater that is placed inside the jacket as per the temperature sensed by the LM35. This jacket gives better protection and safety to the soldiers or a person who is working in extreme weather conditions. The person or soldiers have to work in extreme weather condition; they are always ready for their duties no matter how tough the conditions are. All common people or the civil person and some scientist also who are living in extreme weather condition are important so this project has been implemented to secure a person life who is sacrifice all the things to save our nation, Life. This system is designed to give protection and increase work efficiency of the person. The main controller is Arduino Uno which controls the fan and heater as per temperature and also check the status of panic switch if it pressed it will send a message to concerned person to avoid a panic situation. In this paper we have included block diagram of system with operation. So that this system is very useful and will make it easy for the soldier, scientist or the common person to survive and perform his or her duties in such harsh climatic condition.

II. RELATED WORK

Electronic jacket using Arduino for a person working in extreme weather condition is used to avoid health threat of a particular person. So in this we have controlling unit and monitoring unit. Monitoring unit consists of the LM35 and Switch and the controlling unit consists of the GMS, Fan and Heater. Arduino is main controller in this system and as per the system requirement controller has been coded with the program. By checking the temperature of surrounding the fan and heater should turn on as per command given to the controller and it also have to check the status of switch according to the status of the switch the GSM will take further action of sending massage.

Here switch plays an important role that if the person is not feeling well or he is away from the region of actual working and suddenly that person is in the panic so by pressing the switch message will sent to the concerned one so the life of that person will be saved. The fan and heater are provided to maintain a particular temperature so it will avoid an overheating and overcooling of the human body. We can further modify this project by using different kind of sensors and controllers. As we this pandemic situation is going on, so we can use ultrasonic sensor to maintain a proper distance between two persons. As there are symptoms like shortness in breath so in that case if the person is unable contact to concerned one quickly by making use of switch that person can send message to concerned one so that person has been taken to further hospitality.

III. METHODOLOGY

The system consist of GSM, Arduino, Switch, Fan, Heater, LM35, Power supply as shown in figure below. This system works by checking the switch status and LM35 temperature sensors output. If the switch is pressed so it will send the message using GSM and if not pressed the controller will keep on checking the status of the switch to send a message if required and if LM35 sensed temperature gone above a certain level of human standard body temperature so the fan will turn on to avoid overheating which can cause heatstroke and can take a life of person to death. If temperature is below the standard level the Heater should turn on by controller to avoid overcooling of the body.
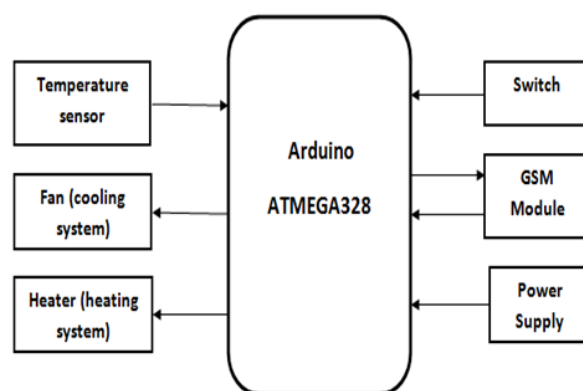

Figure 1: Block Diagram of Electronic Jacket using Arduino for a Person Working at Extreme Weather condition

1.   Temperature Sensor:
It is mainly used for measuring the temperature and the sensor used is LM35. It is a precision IC. The operating range of LM35 is -55 Celsius to +120 Celsius. In LM35 the LM stands for "Linear Monolithic" refers to the analog components integrated into a single piece of silicon and this sensor can be used for thermal screening.
2.   Arduino:
It operates on 5V. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The ATMEGA328P is one kind of single-chip microcontroller formed by Atmel with the megaAVR family. The architecture of Arduino Uno has Harvard architecture with 8 bit RISC processor core. It has Flash Memory is 32 KB and EEPROM of 1kb.
3.   GSM:
This system is used for sending message or we can track the actual position of the person by using GPRS used in it. The SIM900A is readily available model. GSM stands for Global System for Mobile Communication. SIM900A is a dual band GSM/GPRS it works on frequency EGSM 900MHz and DCS 1800 MHz.
4.   Switch:
It is two pin tactile switches. It is simple mechanical switch used to control any signal or a device. It mainly used in input device. The switch is made up of plastic and metal.
5.   Fan:
This cooling fan operates on   0.2A and 5V DC supply. The speed of this fan is 6000RPM. It is mainly used for cooling purpose.
6.   Heater:
The heating pad is constructed using mesh of polyester filament and micro metal conductive fiber folded into a protective polyimide film. It operates on 5V DC supply. Its operating current is ~600mA.
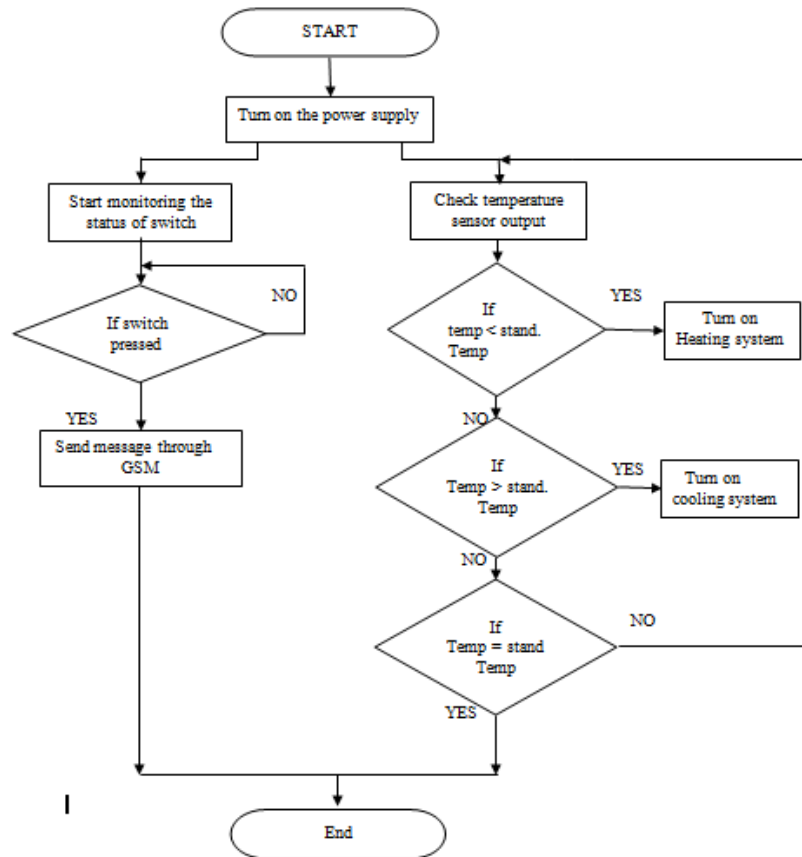
Figure 2: Flow chart of the system

IV.   IMPLEMENTATION

The working of the system has been explained with help of flow chart as shown in figure 2. Start checking temperature and push button status from monitoring unit. Check whether temperature is high, low or stable at mentioned level and check whether push button is pressed in or not.

If temperature is high start cooling fan or temperature is low then start heating system and if switch is pressed in then send message through GSM else message will not send. If nor of above condition is happened system will stay in previous condition. Check the parameter using sensor (temperature sensor) and push button status.

V.   RESULTS

The system has been implemented successfully. Here is some simulation and hardware results are shown in below figures.
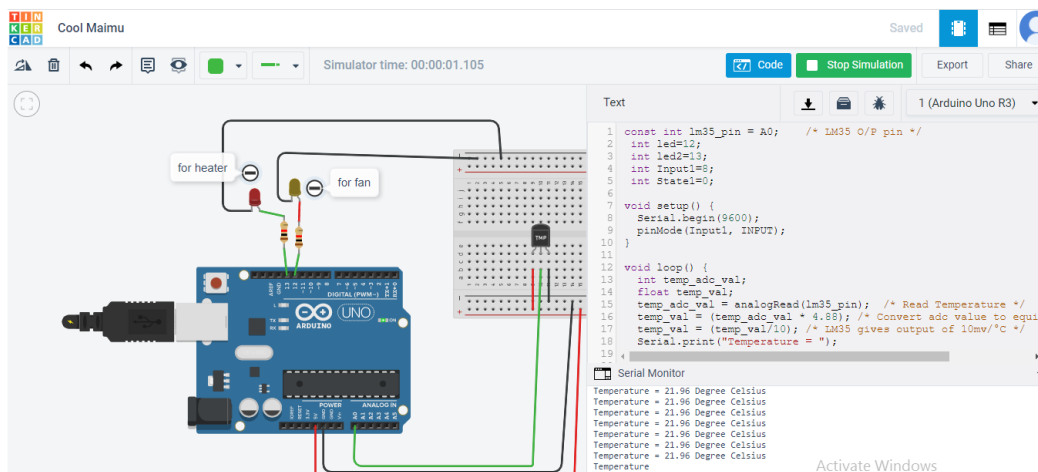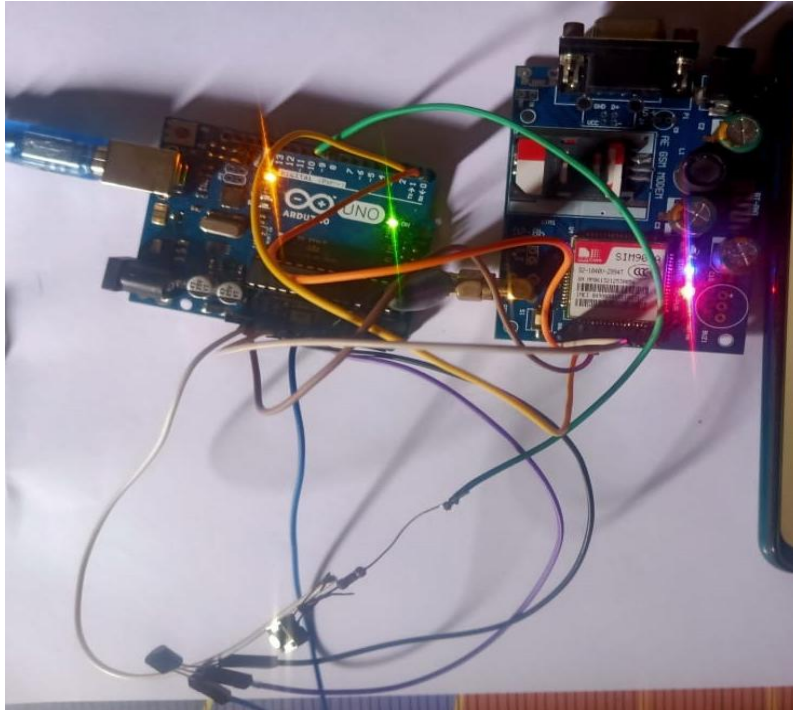

Figure 3: Simulation output

Figure 4: Hardware

VI.   CONCLUSION:

This jacket is useful for the soldiers, scientists and other civil people who are leaving in extreme weather condition. Such as when the climatic condition is extremely hot then cooling system will work and when the climatic condition is extremely cool then heating system will work. In addition to that here we are calculated temperature also by using temperature sensor and GSM also we are used.

VII.   FUTURE SCOPE

In this system we can further modify by using IOT, gas sensor to avoid death because of poisonous gas, heartbeat sensor to check the heart beats are ok or not , ultrasonic sensor to check the distance and IR sensor to find an obstacles.

REFERENCES:

[1]. Fernando Seoane,Javier Ferreira,Lorena Alvaretz,Ruben Buendia,David Ayllón,Cosme Llerena and Roberto Gilpita,Sensorized Garments and Textrode-Enabled Measurements Instrumentation for Ambulatory Assessment of the Autonomic Nervous System Response in the ATREC Project, Sensors 13(7), 8997-9015,2013.

[2]. F. Accelerometer, Guide Contents Guide Contents Overview Wiring with Conductive Thread Programming Downloads Files Schematic Fabrication Print, 2016.

[3]. ”Cool Vest with 3 portable reservoir options for hot and humid daysstay dry & keep cool .”Veskimo Personal Cooling Systems.N.p.,n.d. Web.13 Dec.2013.

[4]. Je-Hyeong Bahk, Megan Y oungs, Kazuaki Yazawa, Ali Shakouri , “An online simulator for thermo-electric cooling and power generation”, 978-1-4673-5261-1/13/$31.00 ©2013 IEEE.

[5]. Rasit Ahıska, Hayati Mamur, “A review: Thermo-electric generators in renewable energy”, International Journal of Renewable Energy Research” Hayati Mamur et al., Vol.4, No.1, 2014.

[6]. Surith Nivas M, Vishnu Vardhan D, Raam kumar PH, Sai Prasad S , Ramya.K, “Photovoltaic Driven Dual PurposeThermo-electric Refrigerator for Rural India”, International Journal of Advancements in Research & Technology, Vol.2, Issue 6, pp. 111-117, June-2013.

[7]. Manoj Kumar Rawat, Prasanta Kumar Sen, Himadri Chattopadhyay, Subhasis Neogi, “Developmental and Experimental Study of Solar Powered Thermo-electric Refrigeration System”, International Journal o Engineering Research and Applications (IJERA), Vol. 3, Issue 4, pp.2543 2547, Jul-Aug 2013.

[8]. Adarsh K S, Arun Dinesh, Jyothy Elizebeth D: “ Solar Based E-Uniform For Soldier’s Who Work At Extreme Temperature Regions”, International Journal of Engineering Research and General Science Volume 3, Issue 3, May-June, 2015, pp. 993 – 998.